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OCCOQUAN RESERVOIR, FAIRFAX COUNTY, VIRGINIA

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

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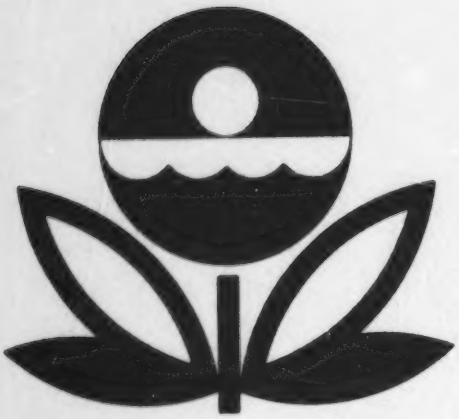

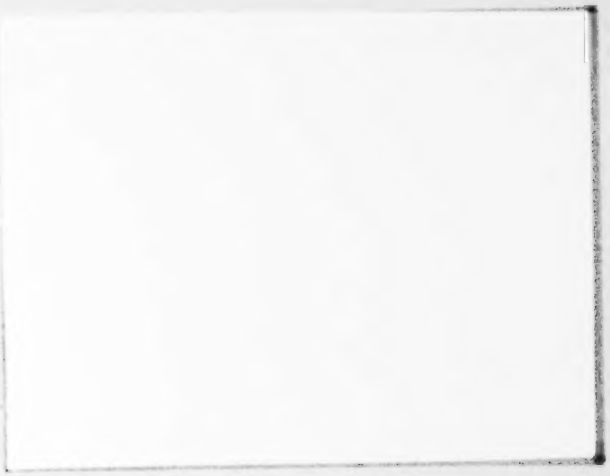

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

1a

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REPORT

ON

OCCOQUAN RESERVOIR

FAIRFAX COUNTY

VIRGINIA

EPA REGION IV

WORKING PAPER No. 464

WITH THE COOPERATION OF THE

VIRGINIA STATE WATER CONTROL BOARD

AND THE

VIRGINIA NATIONAL GUARD

JUNE, 1975

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Virginia State Water Control Board for professional involvement and to the Virginia National Guard for conducting the tributary sampling phase of the Survey.

Eugene T. Jensen, Executive Secretary of the State Water Control Board; Michael A. Bellanca, Director; Jean W. Gregory, Pollution Control Specialist; and Robert W. Pitchford, Pollution Control Technician; Bureau of Surveillance and Field Studies; provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

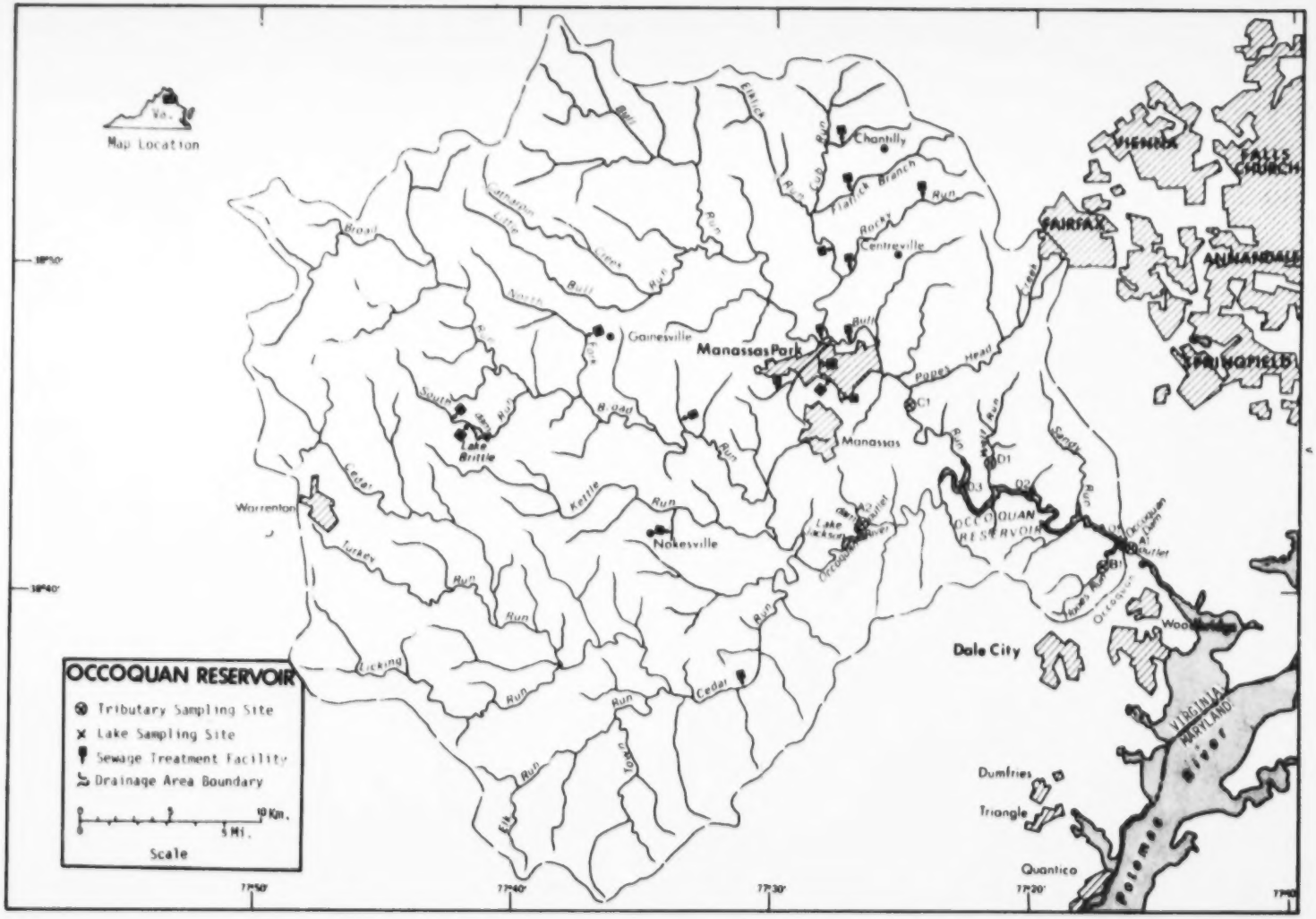
Major General William J. McCaddin, the Adjutant General of Virginia, and Project Officer Lt. Colonel James D. Manley, who directed the volunteer efforts of the Virginia National Guardsmen, also are gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF VIRGINIA

LAKE NAME	COUNTY
Bluestone	Giles, VA; Mercer, Monroe, Summers, WV
Chesdin	Amelia, Chesterfield, Dinwiddie
Chickahominy	Charles City, New Kent
Claytor	Pulaski
J. H. Kerr	Charlotte, Hallifax, Micklenburg, VA; Granville, Vance, Warren, NC
J. W. Flannagan	Dickenson
Occoquan	Fairfax, Prince William
Rivanna	Albemarle
Smith Mountain	Bedford, Franklin, Pittsylvania


Va.
Map Location
OCCOQUAN RESERVOIR
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
10 Km.
5 Mi.
Scale
Chantilly
Centreville
Gainesville
Manassas Park
Manassas
Lake Brittle
Warrenton
Nokesville
Dale City
Dumfries
Triangle
Quantico
VIENNA
FALLS CHURCH
FAIRFAX
ANNANDALE
SPRINGFIELD
OCCOQUAN RESERVOIR
VIRGINIA
MARYLAND
Potomac River
Bull Run
Broad Run
Cedar Run
Kettle Run
Turkey Run
Licking Run
Tonyat Run
Elk Run
Popes Head
Sandy Run
Occoquan River
Flatlick Branch
Rocky Run
Little Rocky Run
Catharpin Creek
South Fork
North Fork
C1
D1
D2
D3
B1
A
38°50'
38°40'
77°50'
77°40'
77°30'
77°20'

OCCOQUAN RESERVOIR

STORET NO. 5108

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Occoquan Reservoir is eutrophic. Of the eight lakes sampled in Virginia in 1973, it ranked last in overall trophic condition when compared using a combination of six parameters*. Seven lakes had less median total phosphorus, median dissolved phosphorus, and median inorganic nitrogen; five lakes had less mean chlorophyll a; and five had greater mean Secchi disc transparency. Marked depression or depletion of dissolved oxygen with depth occurred at all sampling stations during the summer and fall sampling.

Extensive nuisance algae conditions have been noted in the past in this reservoir (Ketelle and Uttormark, 1971); however, Survey limnologists did not observe nuisance algae during the sampling year.

B. Rate-Limiting Nutrient:

The algal assay results are not considered indicative of conditions in the reservoir due to nutrient losses in the sample during shipment from the field to the laboratory. The reservoir data indicate phosphorus limitation at all sampling stations in April and nitrogen limitation at two of the three stations in July and September (see page 8).

* See Appendix A.

C. Nutrient Controllability:

1. Point sources--During the sampling year, phosphorus contributions from known point sources accounted for 25.3% of the total load to Occoquan Reservoir. Most of this load (22.3%) was contributed by the eleven wastewater treatment plants impacting Bull Run or streams tributary to it. The remaining 3.0% came from the six wastewater treatment plants discharging to tributaries of the Occoquan River.

The present loading of 13.62 $g/m^2/yr$ is nine times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as eutrophic loading (see page 14). However, Vollenweider's model probably does not apply to water bodies with short hydraulic retention times, and the mean hydraulic retention time of Occoquan Reservoir is only 27 days. Nonetheless, the existing trophic condition of the reservoir is evidence of excessive nutrient loads.

Although primary production apparently is limited by nitrogen during part of the year, if phosphorus loads were sufficiently reduced, a persistent phosphorus limitation probably could be attained (see page 8), and the present rate of eutrophication of the reservoir could be slowed. If phosphorus discharges from the 17 major contributors were completely removed or diverted, the loading would be lowered to 10.18 $g/m^2/year$, and the total phosphorus input to Occoquan Reservoir would be reduced to about 75% of the present loading.

Phosphorus removal or diversion has been recommended in a report on previous studies of the reservoir (Sawyer, 1970). Survey findings support this recommendation.

A recent publication indicates that the Upper Occoquan Sewage Authority is building a regional facility that will eliminate eleven of the secondary treatment plants (Suhr and Kepple, 1975). The plant will include advanced treatment for nutrient removal. As attainment of the phosphorus effluent standard of 0.1 mg/l established by the Virginia State Water Control Board is achieved, gradual water quality improvement should result.

2. Non-point sources--The phosphorus contribution of non-point sources accounted for 74.7% of the total load to the reservoir during the sampling year. Bull Run contributed 63.5%, the Occoquan River contributed 9.7%, and the two remaining gaged tributaries contributed 0.2% of the total input. Ungaged tributaries were estimated to have contributed 1.2% of the total.

Bull Run had a very high phosphorus export rate (124 $kg/km^2/yr$) as compared to the other gaged tributaries; e.g., the Occoquan River (10 $kg/km^2/yr$), Hooes Run (11 $kg/km^2/yr$), and Wolf Creek (6 $kg/km^2/yr$). This may have been due to unknown point sources impacting Bull Run and its tributaries, underestimation of loads from known point sources, or "natural drainage from forested, agricultural and urban lands" (Sawyer, op. cit.).

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 6.88 kilometers^2.
2. Mean depth: 4.9 meters.
3. Maximum depth: Unknown.
4. Volume: 33.712 x 10^6 m^3.
5. Mean hydraulic retention time: 27 days.

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Occoquan River	888.4	8.4
Hooes Run	11.0	0.1
Bull Run	479.1	4.6
Wolf Run	15.6	0.1
Minor tributaries & immediate drainage -	132.3	1.3
Totals	1,526.4	14.5

2. Outlet -

Occoquan River	1,533.3**	14.5

C. Precipitation***:

1. Year of sampling: 85.6 centimeters.
2. Mean annual: 101.5 centimeters.

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† Table of metric conversions--Appendix B.
†† Bellanca, 1975.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Includes area of lake.
*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Occoquan Reservoir was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from three stations on the reservoir and from a number of depths at each station (see map, page v). During each visit, a single depth-integrated (4.6 m to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. In July and September, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 17.1 meters at station 1, 7.6 meters at station 2, and 7.9 meters at station 3.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR OCCOQUAN RESERVOIR
STORET CODE 5108

PARAMETER	1ST SAMPLING (4/10/73) 3 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (7/19/73) 3 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (9/29/73) 3 SITES RANGE	MEAN	MEDIAN
TEMP (C)	11.3 - 12.4	11.9	12.0	16.0 - 28.7	23.3	22.6	21.3 - 24.2	22.7	22.7
DISS OXY (MG/L)	6.3 - 10.6	9.2	9.2	0.0 - 9.4	2.4	0.4	1.0 - 5.8	3.2	3.3
CNDCTVY (MCROMO)	92. - 110.	100.	100.	96. - 172.	124.	122.	40. - 190.	99.	118.
PH (STAND UNITS)	7.2 - 8.7	8.5	8.6	7.1 - 7.6	7.4	7.3	6.6 - 8.2	7.2	7.1
TOT ALK (MG/L)	19. - 25.	21.	20.	31. - 61.	38.	34.	31. - 41.	35.	36.
TOT P (MG/L)	0.080 - 0.105	0.096	0.100	0.040 - 0.678	0.169	0.099	0.069 - 0.192	0.096	0.077
ORTHO P (MG/L)	0.019 - 0.045	0.035	0.040	0.016 - 0.306	0.067	0.038	0.019 - 0.066	0.033	0.035
NO2+NO3 (MG/L)	0.360 - 0.470	0.412	0.410	0.060 - 0.320	0.159	0.130	0.060 - 0.760	0.281	0.160
AMMONIA (MG/L)	0.100 - 0.160	0.131	0.130	0.100 - 1.640	0.494	0.310	0.060 - 0.400	0.239	0.270
KJEL N (MG/L)	0.500 - 1.000	0.707	0.700	0.700 - 2.800	1.200	1.000	0.500 - 1.200	0.883	0.900
INORG N (MG/L)	0.460 - 0.600	0.543	0.550	0.160 - 1.820	0.653	0.580	0.130 - 1.160	0.440	0.435
TOTAL N (MG/L)	0.970 - 1.400	1.119	1.100	0.770 - 2.980	1.359	1.310	0.670 - 1.860	1.084	1.075
CHLRPYL A (UG/L)	****** -**********	**********	**********	3.4 - 15.7	11.5	15.5	9.9 - 17.9	13.3	12.1
SECCHI (METERS)	0.3 - 0.3	0.3	0.3	0.8 - 1.8	1.4	1.5	0.8 - 1.8	1.2	0.9

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
04/10/73	1. *Asterionella sp.*	1,529
	2. Flagellates	257
	3. *Melosira sp.*	122
	4. *Synedra sp.*	41
	5. *Gyrosigma sp.*	14
	Other genera	21
	Total	1,984
07/19/73	1. *Coelastrum sp.*	1,541
	2. *Scenedesmus sp.*	522
	3. Flagellates	492
	4. *Fragellaria sp.*	426
	5. *Kirchneriella sp.*	164
	Other genera	561
	Total	3,706
09/29/73	1. *Melosira sp.*	3,504
	2. Flagellates	782
	3. *Phacus sp.*	116
	4. *Coelastrum sp.*	87
	5. *Stephanodiscus sp.*	58
	Other genera	202
	Total	4,749

2. Chlorophyll *a* -

Sampling Date	Station Number	Chlorophyll *a* (µg/l)
07/19/73	01	15.7
	02	15.5
	03	3.4
09/29/73	01	9.9
	02	17.9
	03	12.1

C. Limiting Nutrient Study:

The algal assay results are not considered indicative of conditions in the reservoir because of significant nutrient losses in the sample during shipment from the field to the laboratory.

The reservoir data indicate a combination of limiting nutrients. Following is a tabulation of the mean inorganic nitrogen/orthophosphorus ratios for each of the sampling stations and times with the indicated limiting nutrient in parentheses.

Station	04/10/73	07/19/73	09/29/73
01	14/1 (P)	14/1 (P)	13/1 (N?)
02	14/1 (P)	11/1 (N)	12/1 (N)
03	24/1 (P)	8/1 (N)	15/1 (P)

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Virginia National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of March, May, and June when two samples were collected. Sampling was begun in July, 1973, and was completed in June, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Virginia District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient loads, in $kg/km^2/year$, at stations B-1 and D-1 and multiplying the means by the ZZ area in km^2.

The operators of the Linton Hall School; Camp Upshur, Marine Corps; Fairfax County Flatlick, Rocky Run, Greenbriar, Middle Cub Run, and Upper Cub Run; U.S. Army Vint Hill #1 and # 2; Town of Manassas Northside and Liberia; Town of Manassas Park North and South; Greater Manassas

* See Working Paper No. 175.

Old Centerville and Loch Lomond wastewater treatment plants provided monthly effluent samples and corresponding flow data.

The operator of the wastewater treatment plant at Gainesville did not participate in the Survey, and nutrient loads were estimated at 1.134 kg P and 3.401 kg N/capita/year. The operator of the Nokesville High School wastewater treatment plant also did not participate. However, no information was available on the population served, and the nutrient loads could not be estimated but probably were of minor significance.

It is noted that the Camp Upshur plant was closed from 12/73 through 5/74 for installation of phosphorus removal equipment, and phosphorus removal is to be provided at the U.S. Army plants and the two Manassas Park plants in the near future.

A. Waste Sources:

1. Known municipal† -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Linton Hall School	165	prim. clarifier	14.6	Trib. to Broad Run
Nokesville High School	?	prim. clarifier	?	Trib. to Kettle Run
Camp Upshur, Marine Corps.	213	act. sludge	485.2	Cedar Run
Fairfax County -				
Flatlick	2,900	act. sludge + P removal	1,253.6	Flatlick Run
Big Rocky Run	2,200	act. sludge	725.1	Big Rocky Run
Greenbriar	7,500	act. sludge + P removal	2,544.1	Big Rocky Run
Middle Cub Run	4,900	act. sludge + P removal	2,134.7	Cub Run
Upper Cub Run	1,500	act. sludge	663.6	Cub Run
U.S. Army -				
Vint Hill #1	656††	tr. filter	248.6	South Run
Vint Hill #2	704††	tr. filter	266.3	South Run
Town of Manassas -				
Northside	6,600	tr. filter & P removal	2,342.0	Flat Branch
Liberia	-	act. sludge + P removal	768.7	Flat Branch
Town of Manassas				
Park #1	12,000	act. sludge	893.0	Bull Run
#2		act. sludge	584.8	Bull Run
Greater Manassas SD				
Centerville	25,340*	act. sludge + P removal	6,255.4	Bull Run
Loch Lomond		act. sludge + P removal	3,335.9	Bull Run
Gainesville/ Util./Lakeview Estates***	150	ext. aer.	56.8**	North Fork of Broad Run

2. Known industrial - None

† Gregory, 1973; Bingham, 1973; Gozikowski, 1973.
†† Actual population served is classified information; pop. shown is estimate based on flow of 0.3785 m^3/capita/day.
* Population estimate based on flow of 0.3785 m^3/capita/day.
** Flow estimated at 0.3785 m^3/capita/day.
*** Anonymous, 1971.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Occoquan River	9,065	9.7
Hooes Run	125	0.1
Bull Run	59,515	63.5
Wolf Run	90	0.1
b. Minor tributaries & immediate drainage (non-point load) -	1,125	1.2
c. Known municipal STP's -		
Linton Hall School	95	0.1
Nokesville High School	?	-
Camp Upshur, Marine Corps	695	0.7
Fairfax County -		
Flatlick	925	1.0
Big Rocky Run	1,050	1.1
Greenbriar	3,885	4.1
Middle Cub Run	2,120	2.3
Upper Cub Run	725	0.8
U.S. Army -		
Vint Hill #1	810	0.9
Vint Hill #2	1,020	1.1
Town of Manassas -		
Northside	1,130	1.2
Liberia	600	0.6
Town of Manassas Park		
#1	3,280	3.5
#2	1,780	1.9
Greater Manassas SD -		
Centerville	2,590	2.8
Loch Lomond	2,790	3.0
Gainesville/Util./Lakeview Estates	170	0.2
d. Septic tanks* -	5	<0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	120	0.1
Total	93,710	100.0

2. Outputs -

Lake outlet - Occoquan River 36,005

3. Net annual P accumulation - 57,705 kg.

* Estimate based on 18 lakeshore dwellings; see Working Paper No. 175.
** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/ yr	% of total
a. Tributaries (non-point load) -		
Occoquan River	342,180	45.4
Hooes Run	2,960	0.4
Bull Run	255,480	33.9
Wolf Run	3,995	0.5
b. Minor tributaries & immediate drainage (non-point load) -	34,730	4.6
c. Known municipal STP's -		
Linton Hall School	230	<0.1
Nokesville High School	?	-
Camp Upshur, Marine Corps	2,235	0.3
Fairfax County -		
Flatlick	4,830	0.6
Big Rocky Run	3,860	0.5
Greenbriar	14,700	1.9
Middle Cub Run	9,380	1.2
Upper Cub Run	2,595	0.4
U.S. Army -		
Vint Hill #1	1,970	0.3
Vint Hill #2	1,265	0.2
Town of Manassas -		
Northside	13,315	1.8
Liberia	4,420	0.6
Town of Manassas Park		
#1	6,465	0.9
#2	3,260	0.4
Greater Manassas SD -		
Centerville	24,355	3.2
Loch Lomond	13,600	1.8
Gainesville/Util./Lakeview Estates	510	0.1
d. Septic tanks* -	190	<0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	7,430	1.0
Total	753,955	100.0

2. Outputs -

Lake outlet - Occoquan River 696,985

3. Net annual N accumulation - 56,970 kg.

* Estimate based on 18 lakeshore dwellings; see Working Paper No. 175.
** See Working Paper No. 175.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Occoquan River	10	385
Hooes Run	11	269
Bull Run	124	533
Wolf Run	6	256

E. Yearly Loads:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m²/yr	13.62	8.39	109.6	8.3

Vollenweider phosphorus loadings (g/m²/yr) based on mean depth and mean hydraulic retention time of Occoquan Reservoir:

"Dangerous" (eutrophic loading)	1.52
"Permissible" (oligotrophic loading)	0.76

V. LITERATURE REVIEWED

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VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
5103	CLAYTOR LAKE	0.031	0.450	434.500	5.642	14.900	0.008
5105	JOHN W. FLANNAGAN DAM	0.011	0.320	415.700	5.955	14.800	0.004
5106	JOHN H. KERR RESERVOIR	0.044	0.290	458.937	8.833	15.000	0.009
5108	OCCOQUAN RESERVOIR	0.098	0.525	459.750	12.417	15.000	0.037
5110	SMITH MOUNTAIN LAKE	0.015	0.410	414.667	11.593	15.000	0.005
5111	LAKE CHESDIN	0.044	0.240	465.778	12.556	14.800	0.008
5112	CHICKAHOMINY LAKE	0.066	0.125	455.333	13.600	9.400	0.017
5113	RIVANNA (SOUTH FORK) RES	0.079	0.475	460.222	6.667	13.000	0.022

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
5103	CLAYTOR LAKE	71 (5)	29 (2)	71 (5)	100 (7)	43 (3)	64 (4)	378
5105	JOHN W. FLANNAGAN DAM	100 (7)	57 (4)	100 (7)	86 (6)	64 (4)	100 (7)	507
5106	JOHN H. KERR RESERVOIR	43 (3)	71 (5)	43 (3)	57 (4)	14 (0)	43 (3)	271
5108	OCCOQUAN RESERVOIR	0 (0)	0 (0)	29 (2)	29 (2)	14 (0)	0 (0)	72
5110	SMITH MOUNTAIN LAKE	86 (6)	43 (3)	86 (6)	43 (3)	14 (0)	86 (6)	358
5111	LAKE CHESDIN	57 (4)	86 (6)	0 (0)	14 (1)	64 (4)	64 (4)	285
5112	CHICKAHOMINY LAKE	29 (2)	100 (7)	57 (4)	0 (0)	100 (7)	29 (2)	315
5113	RIVANNA (SOUTH FORK) RES	14 (1)	14 (1)	14 (1)	71 (5)	86 (6)	14 (1)	213

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	5105	JOHN W. FLANNAGAN DAM	507
2	5103	CLAYTOR LAKE	378
3	5110	SMITH MOUNTAIN LAKE	358
4	5112	CHICKAHOMINY LAKE	315
5	5111	LAKE CHESDIN	285
6	5106	JOHN H. KERR RESERVOIR	271
7	5113	RIVANNA (SOUTH FORK) RES	213
8	5108	OCCOQUAN RESERVOIR	72

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR VIRGINIA 02/05/76

LAKE CODE 5108 OCCOQUAN RESERVOIR

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 1533.3

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
5108A1	1533.3	19.54	24.35	29.45	22.65	15.86	10.19	7.08	9.63	5.66	5.66	9.91	14.72	14.51
5108A2	888.4	11.33	14.16	16.99	13.31	9.06	5.95	4.25	5.66	3.40	3.40	5.66	8.50	8.44
5108B1	11.0	0.14	0.17	0.20	0.14	0.11	0.06	0.03	0.06	0.02	0.03	0.06	0.08	0.09
5108C1	479.1	6.23	7.65	9.34	7.08	5.10	3.11	2.21	3.11	1.70	1.73	3.11	4.53	4.56
5108D1	15.6	0.20	0.25	0.28	0.20	0.17	0.08	0.06	0.08	0.03	0.03	0.08	0.14	0.13
5108ZZ	139.9	1.76	2.24	2.69	1.98	1.47	0.79	0.57	0.85	0.40	0.42	0.91	1.30	1.28

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 1533.3
SUM OF SUB-DRAINAGE AREAS = 1534.0

TOTAL FLOW IN = 174.65
TOTAL FLOW OUT = 174.71

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
5108A1	7	73	5.10	15	2.38				
	8	73	12.77	12	3.31				
	9	73	8.10	8	3.34				
	10	73	3.96	14	2.41				
	11	73	2.15	11	2.12				
	12	73	50.40	8	1.98				
	1	74	52.39	20	26.90				
	3	74	19.40	3	1.90	10	2.07		
	4	74	25.49	21	2.38				
	5	74	15.29	19	2.18	31	2.27		
	6	74	18.41	8	2.24	21	2.69		
5108A2	7	73	1.76	15	0.31				
	8	73	8.98	12	0.24				
	9	73	2.68	8	1.50				
	10	73	2.21	14	1.10				
	11	73	4.53	11	2.10				
	12	73	5.66	8	2.83				
	1	74	24.24	20	7.67				
	3	74	9.71	3	5.10	10	3.91		
	4	74	12.29	21	4.25				
	5	74	8.01	19	4.05	31	1.95		
	6	74	8.78	8	3.34	21	2.24		

TRIBUTARY FLOW INFORMATION FOR VIRGINIA 02/05/76

LAKE CODE 5108 OCCOQUAN RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
5108B1	7	73	0.02	15	0.01				
	8	73	0.10	12	0.01				
	9	73	0.02	8	0.01				
	10	73	0.03	14	0.00				
	11	73	0.06	11	0.02				
	12	73	0.25	8	0.03				
	1	74	0.21	20	0.06				
	3	74	0.17	3	0.07	10	0.05		
	4	74	0.04	21	0.05				
	5	74	0.12	19	0.03	31	0.04		
	6	74	0.11	8	0.03	21	0.01		
5108C1	7	73	1.80	15	0.74				
	8	73	2.66	12	0.37				
	9	73	2.69	8	0.76				
	10	73	2.83	14	0.88				
	11	73	11.33	11	1.39				
	12	73	12.74	8	1.47				
	1	74	11.41	20	2.78				
	3	74	5.13	3	2.83	10	2.15		
	4	74	7.48	21	2.55				
	5	74	4.30	19	2.18	31	1.64		
	6	74	5.10	8	2.32	21	1.59		
5108D1	7	73	0.03	15	0.04				
	8	73	0.14	12	0.02				
	9	73	0.03	8	0.03				
	10	73	0.04	14	0.03				
	11	73	0.08	11	0.04				
	12	73	0.36	8	0.06				
	1	74	0.31	20	0.10				
	3	74	0.24	3	0.11	10	0.09		
	4	74	0.05	21	0.09				
	5	74	0.18	19	0.07	31	0.07		
	6	74	0.16	8	0.07	21	0.04		

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 76/02/05

510801
38 41 46.0 077 16 49.0
OCCOQUAN RESERVOIR
51059 VIRGINIA

11EPALES 2111202
3 0060 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/10	10 15	0000	12.4		12	110	7.20	20	0.150	1.000	0.400	0.045
	10 15	0006	12.4	8.6		100	8.50	20	0.160	0.700	0.430	0.040
	10 15	0015	12.4	8.6		95	8.70	20	0.140	0.700	0.410	0.036
	10 15	0025	12.3	8.6		95	8.70	19	0.140	0.800	0.410	0.044
	10 15	0035	12.3	8.6		92	8.60	19	0.130	0.600	0.400	0.032
	10 15	0046	12.2	6.3		92	8.60	20	0.150	0.700	0.400	0.042
	10 15	0056	12.1	8.2		92	8.60	21	0.160	0.800	0.420	0.039
73/07/19	14 40	0000	28.3		60	119	7.50	32	0.110	0.700	0.070	0.017
	14 40	0004	26.8	5.4		114	7.30	31	0.100	0.900	0.060	0.010
	14 40	0015	22.2	3.4		102	7.40	32	0.250	0.800	0.120	0.021
	14 40	0025	19.1	0.6		96	7.10	38	0.720	1.400	0.110	0.059
	14 40	0055	17.0	0.0		99	7.30	32	0.370	0.900	0.210	0.030
73/09/29	12 15	0000	23.6		36	40	8.00	31	0.060	1.200	0.130	0.024
	12 15	0005	22.9	4.0		53	7.80	33	0.260	0.600	0.200	0.035
	12 15	0015	22.8	3.0		62	6.70	34	0.280	0.500	0.170	0.035
	12 15	0025	22.6	1.2		60	6.60	33	0.300	0.500	0.210	0.039
	12 15	0040	22.2	1.0		56	6.70	36	0.300	0.800	0.180	0.038

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/10	10 15	0000	0.101	
	10 15	0006	0.099	
	10 15	0015	0.104	
	10 15	0025	0.097	
	10 15	0035	0.100	
	10 15	0046	0.100	
	10 15	0056	0.105	
73/07/19	14 40	0000	0.048	15.7
	14 40	0004	0.058	
	14 40	0015	0.079	
	14 40	0025	0.202	
	14 40	0055	0.099	
73/09/29	12 15	0000	0.146	9.9
	12 15	0005	0.070	
	12 15	0015	0.076	
	12 15	0025	0.075	
	12 15	0040	0.086	

STORET RETRIEVAL DATE 76/02/05

510802
38 43 10.0 077 20 14.0
OCCOQUAN RESERVOIR
51059 VIRGINIA

11EPALES
3

2111202
0025 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/10	10 50	0000	12.0			110	8.60	23	0.120	0.800	0.450	0.040
	10 50	0006		9.8		110	8.60	25	0.100	0.600	0.450	0.040
	10 50	0015	11.9	10.0		107	8.60	23	0.130	0.500	0.470	0.042
	10 50	0021	11.9	10.0		105	8.50	24	0.110	0.600	0.450	0.044
73/07/19	14 10	0000	28.7		72	136	7.60	34	0.120	0.800	0.150	0.021
	14 10	0005	27.6	9.4		129	7.40	33	0.100	0.700	0.110	0.024
	14 10	0015	22.6	0.2		131	7.20	38	0.590	1.100	0.320	0.075
	14 10	0025	19.5	0.0		122	7.30	41	1.000	1.700	0.180	0.109
73/09/29	12 30	0000	23.6		70	124	7.20	35	0.160	1.000	0.090	0.021
	12 30	0005	23.1	5.8		122	7.70	35	0.170	0.800	0.090	0.025
	12 30	0015	22.5	3.6		120	7.00	36	0.300	1.100	0.110	0.038
	12 30	0025	22.1	2.8		120	7.20	36	0.330	1.100	0.150	0.035

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/10	10 50	0000	0.105	
	10 50	0006	0.099	
	10 50	0015	0.101	
	10 50	0021	0.100	
73/07/19	14 10	0000	0.040	15.5
	14 10	0005	0.060	
	14 10	0015	0.167	
	14 10	0025	0.343	
73/09/29	12 30	0000	0.069	17.9
	12 30	0005	0.075	
	12 30	0015	0.112	
	12 30	0025	0.095	

STORET RETRIEVAL DATE 76/02/05

510803
38 43 23.0 077 22 53.0
OCCOQUAN RESERVOIR
51153 VIRGINIA

11EPALES
3

2111202
0030 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/10	13 10	0000	11.3		12	100	8.70	20	0.120	0.800	0.360	0.020
	13 10	0006	11.3	10.5		100	8.60	19	0.100	0.700	0.360	0.020
	13 10	0016	11.3	10.4		100	8.70	20	0.130	0.700	0.390	0.019
	13 10	0026	11.3	10.6		98	8.60	20	0.120	0.600	0.380	0.022
73/07/19	13 40	0000	28.7		30	137	7.50	34	0.110	1.300	0.130	0.016
	13 40	0005	26.4	5.2		172	7.30	42	0.310	1.000	0.310	0.075
	13 40	0015	20.5	0.0		119	7.50	43	1.000	1.500	0.200	0.087
	13 40	0025	16.0	0.0		130	7.20	61	1.640	2.000	0.180	0.306
73/09/29	12 50	0000	24.2	4.3	30	115	8.20	36	0.070	1.100	0.060	0.019
	12 50	0005	21.8	4.2		123	7.30	36	0.160	0.800	0.260	0.026
	12 50	0015	21.3	2.6		190	6.90	41	0.403	1.100	0.760	0.066

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/10	13 10	0000	0.081	
	13 10	0006	0.082	
	13 10	0016	0.080	
	13 10	0026	0.081	
73/07/19	13 40	0000	0.074	3.4
	13 40	0005	0.166	
	13 40	0015	0.185	
	13 40	0025	0.678	
73/09/29	12 50	0000	0.079	12.1
	12 50	0005	0.075	
	12 50	0015	0.192	

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/03/26

5108A1
38 41 40.0 077 16 35.0
OCCOQUAN RIVER
51117 7.5 OCCOQUAN
0/OCCOQUAN RES
1 MI DOWNSTREAM OF OCCOQUAN DAM
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/08/12	12	40	0.056	0.560	0.189	0.029	0.085
73/09/08	14	00	0.210	1.150	0.220	0.028	0.090
73/10/14	13	00	0.520	0.900	0.088	0.040	0.060
73/11/11	12	45	0.430	0.450	0.072	0.015	0.035
73/12/08	14	00	0.490	0.800	0.060	0.016	0.035
74/01/20	12	30	0.850	0.300	0.040	0.040	0.065
74/03/03	12	10	0.520	0.500	0.020	0.010	0.050
74/03/10	13	15	0.528	1.400	0.085	0.015	0.051
74/04/21	13	00	0.384	2.700	0.070	0.020	0.180
74/05/19	13	00	1.260	1.300	0.250	0.025	0.110
74/05/31	12	30	0.700	0.800	0.125	0.010	0.185
74/06/08	13	00	0.310	1.500	0.160	0.020	0.035
74/06/21	12	30	0.352	0.600	0.080	0.020	0.045

STORET RETRIEVAL DATE 75/03/26

5108A2
38 42 20.0 077 26 47.0
OCCOQUAN RIVER
51 7.5 INDEPENDENT
1/OCCOQUAN RES
RT 234 BRDG JUST BELO LK JACKSON DAM
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/15	09 45		0.200	0.710	0.069	0.012	0.055
73/08/12	10 15		0.042	2.500	0.132	0.014	0.050
73/09/08	12 45		0.024	0.160	0.067	0.009	0.055
73/10/14	10 00		0.160	0.850	0.046	0.019	0.065
73/11/11	10 10		0.190	0.800	0.085	0.015	0.060
73/12/08	10 45		0.028	0.400	0.016	0.012	0.060
74/01/20	10 15		0.756	0.100K	0.040	0.015	0.035
74/03/03	10 20		0.108	0.800	0.045	0.005K	0.025
74/03/10	10 15		0.088	1.000	0.050	0.005	0.025
74/04/21	10 15		0.088	0.600	0.040	0.005	0.040
74/05/19	10 30		0.288	3.700	0.135	0.010	0.045
74/05/31	10 15		0.560	0.400	0.042	0.005K	0.050
74/06/08	10 30		1.100	1.000	0.270	0.010	0.045
74/06/21	10 15		0.520	0.700	0.270	0.020	0.030

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/26

510881
38 40 50.0 077 17 14.0
HOOES RUN
51 7.5 OCCOQUAN
T/OCCOQUAN RES
RD BRDG .5 MI N OF AGNEWVILLE
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/15	12	34	0.250	1.470	0.040	0.012	0.050
73/08/12	12	15	0.042	1.100	0.115	0.008	0.015
73/09/08	10	40	0.025	0.170	0.160	0.006	0.015
73/10/14	12	20	0.030	0.750	0.042	0.014	0.015
73/11/11	12	30	0.150	0.450	0.067	0.014	0.035
73/12/08	13	30	0.240	1.175	0.052	0.024	0.130
74/01/20	12	00	0.390	0.500	0.080	0.035	0.065
74/03/03	12	40	0.080	1.900	0.055	0.015	0.052
74/03/10	12	45		1.400		0.020	0.050
74/04/21	12	45	0.060	0.400	0.035	0.022	0.030
74/05/19	13	15	0.160	1.600	0.110	0.010	0.035
74/05/31	12	00	0.088	0.500	0.025	0.015	0.060
74/06/08	12	30	0.096	0.500	0.055	0.010	0.040
74/06/21	12	00	0.168	0.800	0.170	0.010	0.020

STORET RETRIEVAL DATE 75/03/26

5108C1
38 45 47.0 077 24 46.0
BULL RUN
51 7.5 MANASSAS
1/OCCOQUAN RES
BANK AT END OF YATES FORD RD
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/15	11 05		1.260	0.990	0.330	0.560	0.650
73/08/12	10 55		1.060	2.600	0.280	1.380	1.450
73/09/08	10 30		1.000	3.150	0.338	0.710	0.830
73/10/14	10 50		1.640	1.150	0.198	0.920	1.050
73/11/11	11 05		2.080	1.850	0.710	1.000	1.250
73/12/08	11 40		0.870	0.600	0.136	0.360	0.450
74/01/20	11 05		1.060	0.500	0.232	0.120	0.160
74/03/03	11 20		0.830	1.700	0.333	0.260	0.350
74/03/10	11 15		0.840	1.400	0.250	0.260	0.345
74/04/21	11 15		0.680	0.700	0.160	0.185	0.200
74/05/19	11 30		1.100	1.900	0.220	0.260	0.330
74/05/31	11 05		1.520	0.800	0.240	0.250	0.345
74/06/08	11 45		0.176	0.700	0.035	0.005	0.020
74/06/21	11 05		1.600	0.600	0.165	0.330	0.380

STORET RETRIEVAL DATE 75/03/26

5108D1
38 44 10.0 077 21 52.0
WOLF RUN
51 7.5 OCCOQUAN
T/OCCOQUAN RES
HENDERSON RD BRDG 1.5 MI SW FARRS CORNER
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/15	11	34	0.230	0.300	0.025	0.021	0.030
73/08/12	11	30	0.210	1.320	0.075	0.024	0.025
73/09/08	11	00	0.115	0.170	0.168	0.017	0.017
73/10/14	11	30	0.010K	0.250	0.024	0.006	0.010
73/11/11	11	45	0.028	0.700	0.032	0.012	0.012
73/12/08	12	30	0.052	0.400	0.012	0.005K	0.040
74/01/20	11	30	0.176	0.100K	0.028	0.010	0.010
74/03/03	11	55	0.100	0.500	0.040	0.010	0.015
74/03/10	12	00	0.108	1.200	0.045	0.010	0.010
74/04/21	12	00	0.020	0.300	0.027	0.007	0.020
74/05/19	12	15	0.184	1.500	0.085	0.015	0.025
74/05/31	11	30	0.104	0.200	0.035	0.010	0.045
74/06/08	12	10	1.500	2.400	0.175	0.230	0.290
74/06/21	11	30	0.160	0.600	0.115	0.020	0.025

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/26

5108FA PR5108FA P000150
38 45 17.0 077 33 45.0
LINTON HALL SCHOOL BRISTON
51117 7.5 GAINESVILLE
T/OCCOQUAN
UNNAMED TRIB/BROAD RUN
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/10/16	11 00								
CP(T)-			0.200	56.500	23.000	8.600	18.900	0.005	0.006
73/10/16	16 00								
73/11/20	11 00								
CP(T)-			0.310	56.000	13.000	6.200	16.000	0.005	0.005
73/11/20	16 00								
74/01/04	11 00								
CP(T)-			0.880	28.000	2.900	6.200	12.500	0.005	0.004
74/01/04	16 00								
74/01/22	11 00								
CP(T)-			0.920	45.000	3.000	6.300	12.000	0.005	0.003
74/01/22	16 00								
74/02/12	11 00								
CP(T)-			0.680	35.000	5.900	7.600	15.000	0.005	0.005
74/02/12	16 00								
74/03/27	11 00								
CP(T)-			0.400	39.000	6.000	8.200	22.000	0.005	0.005
74/03/27	16 00								
74/04/22	11 00								
CP(T)-			0.720	39.000	7.700	8.600	23.000	0.005	0.005
74/04/22	16 00								
74/05/27	11 00								
CP(T)-			0.280	52.000	22.000	9.000	19.000	0.005	0.003
74/05/27	16 00								
74/06/25	11 00								
CP(T)-			0.204	37.000	13.000	10.500	16.000	0.003	0.003
74/06/25	16 00								
74/07/17	11 00								
CP(T)-			0.360	35.000	21.000	12.500	13.500	0.003	0.002
74/07/17	16 00								
74/08/12	11 00								
CP(T)-			0.120	32.000	13.750	13.500	24.000	0.003	0.003
74/08/12	16 00								
74/09/25	11 00								
CP(T)-			0.500	46.000		6.600	13.000	0.003	0.003

STORET RETRIEVAL DATE 75/03/26

5108FA PR5108FA P000150
38 45 17.0 077 33 45.0
LINTON HALL SCHOOL BRISTON
51117 7.5 GAINESVILLE
T/OCCOQUAN
UNNAMED TRIB/BROAD RUN
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/10/07	11	00	0.320	46.000	17.000	13.000	22.000	0.003	0.003

STORET RETRIEVAL DATE 75/03/26

5108HA P05108HA P000750
38 37 30.0 077 31 00.0
MARINE CORPS SCHOOL QUANTICO
51 7.5 NOKESVILLE
T/OCCOQUON
CEDAR RUN/OCCOQUON RIVER
11EPALES 2141204
4 0000 FEET. DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/10/03	08 00								
CP(T)-			3.950	0.900	0.230	2.600	3.600	0.152	0.152
73/10/03	20 00								
73/11/07	08 00								
CP(T)-			0.320	1.700	0.920	4.100	7.100	0.120	0.120
73/11/07	20 00								
73/12/10	08 00								
CP(T)-			1.200	22.000	12.800	6.800	8.400	0.120	0.120
73/12/10	20 00								
74/06/11	08 00								
CP(T)-			21.000	14.000		1.800	3.300	0.106	0.120
74/06/11	20 00								
74/07/10	08 00								
CP(T)-			2.700	1.000K	0.160	0.480	0.765	0.180	0.100
74/07/10	20 00								
74/08/14	08 00								
CP(T)-			15.000	1.000K	0.130	1.450	1.900	0.120	0.157
74/08/14	20 00								

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/26

5108UB P05108UB P007500
38 52 02.0 077 24 30.0
FAIRFAX CO GREENNBRIAR PL CHANTI
51 7.5 MANASSAS
T/OCCOQUAN RESERVOIR
BIG ROCKY RUN/CUB RUN/BULL RUN
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/12/04	00 00								
CP(T)-			2.000	19.000	10.600	6.800	6.800	0.666	0.650
73/12/04	24 00								
74/01/03	00 00								
CP(T)-			1.080	12.500	6.800	4.400	4.700	0.714	0.699
74/01/03	02 00								
74/02/04	00 00								
CP(T)-			0.400	13.000	4.300	4.400	4.500	0.640	0.688
74/02/04	24 00								
74/03/04	00 00								
CP(T)-			0.680	15.000	7.100	4.900	6.100	0.650	0.650
74/03/04	24 00								
74/04/04	00 00								
CP(T)-			0.200	18.000	8.800	4.700	6.000	0.670	0.676
74/04/04	24 00								
74/05/02	00 00								
CP(T)-			0.280	17.000	10.500	4.700	5.200	0.623	0.665
74/05/02	24 00								
74/06/04	00 00								
CP(T)-			0.200	21.000	11.500	5.300	6.100	0.841	0.692
74/06/04	24 00								
74/07/08	00 00								
CP(T)-			0.160	15.000	11.000	2.800	3.600	0.683	0.722
74/07/08	24 00								
74/08/06	00 00								
CP(T)-			0.400	19.000	9.000	1.950	2.800	0.615	0.676
74/08/06	24 00								
74/09/05			0.240	8.700	12.600	1.720	0.820	0.646	0.643
74/10/02	00 00								
CP(T)-			1.160	13.000	9.700	2.100	2.800	0.660	0.681
74/10/02	24 00								
74/11/06	00 00								
CP(T)-			1.200	13.000	6.100	2.600	3.000	0.604	0.653
74/11/06	24 00								
74/12/10	00 00								
CP(T)-			0.800	12.250	7.900	1.280	1.925	0.880	0.642
74/12/10	24 00								

STORET RETRIEVAL DATE 75/03/26

5108UA AS5108UA P002200
38 50 00.0 077 27 02.0
FAIRFAX CO ROCKY RUN PLANT FAIRE
51 7.5 MANASASAS
T/OCCOQUON RESERVOIR
BIG ROCKY RUN/CUB RUN/BULL RUN
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/12/04	00	00							
CP(T)-			0.960	8.000	1.050	11.000	12.500	0.188	0.193
73/12/04	24	00							
74/01/03	00	00							
CP(T)-			0.800	7.250	0.620	8.200	9.800	0.186	0.204
74/01/03	02	00							
74/02/04	00	00							
CP(T)-			0.040	11.000	0.120	3.900	4.365	0.183	0.192
74/02/04	24	00							
74/03/04	00	00							
CP(T)-			1.120	5.500	2.700	3.300	3.780	0.164	0.186
74/03/04	24	00							
74/04/04	00	00							
CP(T)-			0.600	7.400	4.600	1.350	1.680	0.186	0.193
74/04/04	24	00							
74/05/02	00	00							
CP(T)-			0.280	21.000	15.000	3.300	4.100	0.180	0.173
74/05/02	24	00							
74/06/04	00	00							
CP(T)-			0.120	26.000	14.500	2.600	3.400	0.203	0.184
74/06/04	24	00							
74/07/08	00	00							
CP(T)-			0.120	24.000	17.300	4.100	4.100	0.195	0.198
74/07/08	24	00							
74/08/06	00	00							
CP(T)-			0.160	20.000	9.450	3.800	4.600	0.150	0.190
74/08/06	24	00							
74/09/05			0.160	18.500	11.500	2.300	2.400	0.195	0.183
74/10/02	00	00							
CP(T)-			4.600	2.000	0.450	0.250	0.640	0.195	0.199
74/10/02	24	00							
74/11/06	00	00							
CP(T)-			0.160	13.000	5.600	0.340	0.770	0.193	0.197
74/11/06	24	00							
74/12/10	00	00							
CP(T)-			0.158	15.500	7.400	0.066	0.275	0.206	0.198
74/12/10	24	00							

STORET RETRIEVAL DATE 75/03/26

5108TA P05108TA P002900
38 52 15.0 077 27 05.0
FAIRFAX CO FLATLICK PLANT FAIRFA
51 FAIRFAX CO
T/OCCOQUAN RESERVOIR
FLATLICK BRANCH/CUB RUN
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/12/04	00	00							
CP(T)-			6.300	2.300	0.600	2.600	2.600	0.281	0.308
73/12/04	24	00							
74/01/03	00	00							
CP(T)-			0.640	10.500	5.300	0.700	1.000	0.339	0.326
74/01/03	02	00							
74/02/04	00	00							
CP(T)-			3.000	6.800	3.120	1.520	1.900	0.301	0.353
74/02/04	24	00							
74/03/04	00	00							
CP(T)-			7.400	3.000	0.430	4.800	5.500	0.316	0.324
74/03/04	24	00							
74/04/04	00	00							
CP(T)-			4.200	1.700	1.200	2.600	3.000	0.333	0.328
74/04/04	24	00							
74/05/02	00	00							
CP(T)-			8.300	14.000	1.150	0.240	0.410	0.304	0.339
74/05/02	24	00							
74/06/04	00	00							
CP(T)-			1.440	5.000	1.050	2.900	3.300	0.371	0.322
74/06/04	24	00							
74/07/08	00	00							
CP(T)-			0.040	15.000	12.000	1.150	1.500	0.325	0.335
74/07/08	24	00							
74/08/06	00	00							
CP(T)-			0.820	7.300	5.250	0.175	0.660	0.372	0.324
74/08/06	24	00							
74/09/05			5.000	1.500	0.360	1.700	1.800	0.363	0.335
74/10/02	00	00							
CP(T)-			7.300	4.200	2.900		1.200	0.323	0.353
74/10/02	24	00							
74/11/06	00	00							
CP(T)-			8.500	2.900	2.100	1.275	1.300	0.309	0.329
74/11/06	24	00							
74/12/10	00	00							
CP(T)-			9.600	2.130	0.460	1.800	2.130	0.389	0.329
74/12/10	24	00							

STORET RETRIEVAL DATE 75/03/26

S108VA P05108VA P004900
38 50 30.0 077 27 52.0
FAIRFAX CO MIDDLE CUB RUN PLANT
51 7.5 MANASSAS
T/OCCOQUAN RESERVOIR
CUB RUN/BULL RUN
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/12/04	00 00								
CP(T)- 73/12/04	24 00		0.260	13.000	5.250	6.500	6.500	0.590	0.551
74/01/03	00 00								
CP(T)- 74/01/03	02 00		0.960	7.600	3.500	0.670	1.600	0.516	0.585
74/02/04	00 00								
CP(T)- 74/02/04	24 00		0.680	7.500	4.400	2.320	2.800	0.530	0.597
74/03/04	00 00								
CP(T)- 74/03/04	24 00		2.880	7.400	2.900	4.200	4.900	0.525	0.560
74/04/04	00 00								
CP(T)- 74/04/04	24 00		0.760	6.000	3.300	1.350	1.650	0.588	0.558
74/05/02	00 00								
CP(T)- 74/05/02	24 00		0.400	15.000	7.700	3.300	3.900	0.507	0.582
74/06/04	00 00								
CP(T)- 74/06/04	24 00		0.440	13.000	4.600	2.400	2.700	0.607	0.567
74/07/08	00 00								
CP(T)- 74/07/08	24 00		0.240	20.000	12.500	3.450	3.450	0.544	0.554
74/08/06	00 00								
CP(T)- 74/08/06	24 00		0.240	19.000	11.500	2.400	2.550	0.521	0.553
74/09/05			1.320	11.500	5.150	1.600	1.950	0.589	0.559
74/10/02	00 00								
CP(T)- 74/10/02	24 00		1.440	4.500	1.950	2.200	2.200	0.531	0.575
74/11/06	00 00								
CP(T)- 74/11/06	24 00		2.320	8.200	6.200	0.890	1.000	0.515	0.540
74/12/10	00 00								
CP(T)- 74/12/10	24 00		3.520	8.400	6.400	0.260	0.425	0.653	0.550

STORET RETRIEVAL DATE 75/03/26

S108VB P05108VB P001500
38 53 55.0 077 27 47.0
FAIRFAX CO UPPER CUB RUN PLANT
51 FAIRFAX CO
T/OCCOQUON RESERVOIR
UPPER CUB RUN/BULL RUN
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOw-MGD MONTHLY
73/12/04	00 00								
CP(T)- 73/12/04	24 00		6.400	3.100	0.610	12.600	13.500	0.165	0.172
74/01/03	00 00								
CP(T)- 74/01/03	02 00		4.000	2.800	0.114	6.450	7.000	0.177	0.194
74/02/04	00 00								
CP(T)- 74/02/04	24 00		0.040	8.250	0.080	5.900	5.900	0.183	0.180
74/03/04	00 00								
CP(T)- 74/03/04	24 00		0.480	9.400	5.750	3.500	4.100	0.160	0.177
74/04/04	00 00								
CP(T)- 74/04/04	24 00		0.720	7.300	5.200	0.400	0.850	0.168	0.171
74/05/02	00 00								
CP(T)- 74/05/02	24 00		1.040	16.000	9.600	0.720	1.550	0.140	0.174
74/06/04	00 00								
CP(T)- 74/06/04	24 00		0.160	17.000	14.000	0.960	1.350	0.169	0.181
74/07/08	00 00								
CP(T)- 74/07/08	24 00		0.120	15.000	13.000	0.830	1.250	0.213	0.174
74/08/06	00 00								
CP(T)- 74/08/06	24 00		0.200	16.000	13.000	0.295	0.580	0.128	0.181
74/09/05			0.880	4.800	2.800	0.290	0.430	0.151	0.164
74/10/02	00 00								
CP(T)- 74/10/02	24 00		1.080	2.700	1.950	0.260	0.390	0.146	0.170
74/11/06	00 00								
CP(T)- 74/11/06	24 00		0.080	16.000	12.000	0.900	1.300	0.188	0.160
74/12/10	00 00								
CP(T)- 74/12/10	24 00		2.400	3.400	2.300	0.094	0.250	0.195	0.181

STORET RETRIEVAL DATE 75/03/26

5108WA TF5108WA
38 46 13.0 077 27 45.0
US ARMY VINT HILL PLANT # 1
51 7.5 MANASSAS
O/OCCOQUON RESERVOIR
OCCOQUON RESERVOIR
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/01/29	10 00		8.700	16.000	5.800	6.300	10.500	0.105	0.080
74/02/26	08 00		21.000	12.000	4.600	10.000	11.000	0.070	0.067
74/03/15	08 00		5.880	27.000	12.500	7.000	11.000	0.072	0.070
74/04/15	08 00		17.000	6.400	1.125	7.950	10.000	0.056	0.065
74/05/16	08 00		16.800	6.900	0.810	7.100	8.000	0.071	0.063
74/06/17	08 00		6.300	6.700	0.890	5.600	7.100	0.072	0.067
74/07/16	10 00		8.670	7.500	0.430	7.600	9.150	0.064	0.065
74/08/15	08 00		13.600	8.300	0.390	7.600	8.600	0.059	0.057
74/09/16	08 00		9.700	4.850	0.430	6.400	7.900	0.050	0.079
74/10/15	08 00		11.600	4.700	0.260	11.500	13.500	0.034	0.039
74/11/15	08 00		10.100	10.000	0.057	6.200	8.300	0.055	0.058
74/12/23	14 30		9.200	13.000	0.310	5.000	6.400	0.051	0.089
75/01/15	08 15		8.200	6.200	0.080K	4.600	5.500	0.073	0.054

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/26

5108WB TF5108WB
38 44 30.0 077 40 30.0
US ARMY VINT HILL PLANT # 2
51 7.5 CATLETT
D/OCCOQUAN RESERVOIR
OCCOQUAN RESERVOIR
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/01/15	08 00		8.600	3.700	1.360	7.200	7.900	0.095	0.080
74/02/26	08 00		14.400	4.700	1.650	10.500	10.500	0.073	0.067
74/03/15	08 00		12.000	3.650	0.200	11.500	12.500	0.069	0.070
74/04/15	08 00		8.000	3.300	0.360	8.900	9.900	0.079	0.090
74/05/16	08 00		7.000	5.450	0.370	10.500	12.500	0.080	0.075
74/06/17	08 15		5.520	4.900	0.325	6.700	7.600	0.080	0.070
74/07/16	10 30		6.240	2.000	0.120	12.550	13.800	0.063	0.061
74/08/15	08 00		9.200	5.600	0.320	11.500	12.000	0.067	0.062
74/09/16	08 15		8.350	1.700	0.225	9.800	9.800	0.065	0.082
74/10/15	08 15		5.400	2.400	0.350	13.500	14.000	0.056	0.050
74/11/15	08 15		11.000	1.600	0.082	10.300	10.500	0.055	0.054
74/12/23	13 30		9.800	6.500	4.200	9.000	9.300	0.056	0.096
75/01/15	08 30		10.000	6.400	0.080K	0.140	8.400	0.092	0.058

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/26

5108XA TF5108XA P008000
38 46 15.0 077 27 45.0
TOWN OF MANASSA NORTHSIDE STP
51 7.5 MANASSA
T/OCCOQUAN RESERVOIR
FLAT BROOK
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/12/06	08 00								
CP(T)-			0.660	23.000	13.000	0.535	2.350	0.452	0.617
73/12/07	08 00								
74/01/23	08 00								
CP(T)-			1.120	11.000	4.600	0.350	1.950	1.330	0.990
74/01/24	08 00								
74/02/25	08 00								
CP(T)-			0.200	18.000	8.900	1.950	3.500	0.486	0.974
74/02/26	08 00								
74/03/20	08 00								
CP(T)-			0.176	19.000	13.500	0.728	2.000	0.446	0.489
74/03/21	08 00								
74/04/30	00 00								
CP(T)-			0.320	19.000	13.000	0.280	0.770	0.465	0.780
74/04/30	24 00								
74/06/03	15 00		0.760	13.000	7.700	0.350	1.000	1.500	0.875
74/07/02	05 00		0.600	17.000	10.500	0.750	0.910	0.545	0.696
74/07/31	08 00								
CP(T)-			2.600	22.000	15.920	0.180	0.550	0.364	0.393
74/08/01	08 00								
74/09/03	12 45		2.160	18.000	14.000	0.160	0.250	0.520	0.367
74/10/01	10 30		2.520	17.000	12.500	0.170	0.700	0.375	0.515
74/11/01	10 30		2.240	19.000	16.000	0.140	0.480	0.365	0.364
74/12/02	11 00		2.400	8.400	6.800	0.180	1.400	1.910	0.460
75/01/01	16 35		0.400	11.000	10.000	0.078	0.400	0.523	

STORET RETRIEVAL DATE 75/03/26

5108YA P05108YA P004400
38 45 58.0 077 28 28.0
TOWN OF MANASSAS LIBERIA PLANT
51 7.5 MANASSAS
T/OCCOQUON RESERVOIR
UNNAMED STREAM/FLAT LICK BRANCH
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/12/06	08 00								
CP(T)-			0.230	30.000	29.000	0.120	0.710	0.201	0.273
73/12/06	08 00								
74/01/23	08 00								
CP(T)-			0.480	7.000	3.500	0.370	0.880	0.151	0.203
74/01/24	08 00								
74/02/25	08 00								
CP(T)-			0.240	16.000	8.100	3.700	7.700	0.424	0.250
74/02/26	08 00								
74/03/20	08 00								
CP(T)-			0.120	26.000	10.000	8.600	10.000	0.267	0.164
74/03/21	08 00								
74/04/30	00 00								
CP(T)-			4.700	9.000	6.100	1.050	1.450	0.132	0.145
74/04/30	24 00								
74/06/03	15 00		5.600	7.000	4.400	0.560	0.670	0.150	0.130
74/07/02	07 00		1.680	7.800	5.200	0.390	0.500	0.261	0.218
74/07/31	08 00								
CP(T)-			5.600	6.100	3.450	0.460	0.460	0.183	0.200
74/08/01	08 00								
74/09/03	11 55		7.500	5.600	4.000	0.350	0.393	0.259	0.191
74/10/01	11 30		6.900	7.800	4.800	0.200	0.400	0.156	0.158
74/11/01	10 00		7.300	9.900	8.100	0.790	0.730	0.184	0.196
74/12/02	10 30		5.400	10.000	3.800	0.140	0.700	0.950	0.187
75/01/01	17 10		2.880	11.000	8.300	0.120	0.230	0.325	

STORET RETRIEVAL DATE 75/03/26

5108YB AS5108YB
38 47 45.0 077 27 26.0
TOWN OF MANASSAS NORTH
51 7.5 MANASSAS
T/OCCOQUON RESERVOIR
BULL RUN
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/11/30	11 00								
CP(T)- 73/11/30	16 00		5.200	17.000	7.100	11.600	13.500	0.970	0.830
73/12/30	11 00								
CP(T)- 73/12/30	16 00		2.320	7.800	0.040K	2.400	3.400	0.170	0.258
74/01/31	11 00								
CP(T)- 74/01/31	16 00							0.243	0.337
74/02/28	11 00								
CP(T)- 74/02/28	16 00		0.160	16.000	5.950	6.600	7.500	0.158	0.176
74/03/28	11 00								
CP(T)- 74/03/28	16 00		1.440	20.000	7.200	7.800	8.400	0.133	0.163
74/04/30	10 00								
CP(T)- 74/04/30	16 00		2.900	20.000	8.900	9.000	10.000	0.185	0.248
74/05/31	11 00								
CP(T)- 74/05/31	16 00		2.600	13.000	3.400	6.800	8.850	0.129	0.186
74/06/30	11 00								
CP(T)- 74/06/30	16 00		3.680	14.000	4.200	9.100	10.000	0.160	0.206
74/07/31	11 00								
CP(T)- 74/07/31	16 00		2.520	19.000	6.600	6.050	10.000	0.111	0.124
74/08/31	11 00								
CP(T)- 74/08/31	16 00		1.200	17.250		6.000	7.050	0.187	0.153
74/09/30	11 00								
CP(T)- 74/09/30	16 00		1.500	19.500	10.000	5.400	8.200	0.175	0.204
74/10/31	11 00								
CP(T)- 74/10/31	16 00		1.200	19.000	9.150	7.300	9.100	0.139	0.143

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/26

5108YB AS5108YB
38 47 45.0 077 27 26.0
TOWN OF MANASSAS NORTH
51 7.5 MANASSAS
T/OCCOQUON RESERVOIR
BULL RUN
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/11/28	11 00								
CP(T)-			2.800	16.000	7.200	5.600	7.550	0.143	0.140
74/11/28	16 00								

STORET RETRIEVAL DATE 75/03/26

5108YC AS5108YC P003500
38 47 45.0 077 27 26.0
TOWN OF MANASSAS SOUTH
51 7.5 MANASSAS
T/OCCOQUON RESERVOIR
BULL RUN
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/02/28	12 00		1.200	22.000	11.500	10.500	13.000	0.139	0.173
74/03/28	11 00								
CP(T)-			6.900	11.000	2.100	9.150	10.000	0.144	0.145
74/03/28	16 00								
74/04/30	10 00								
CP(T)-			9.100	6.400	0.240	10.500	12.500	0.136	0.206
74/04/30	16 00								
74/05/31	11 00								
CP(T)-			2.640	7.300	0.150	3.300	4.850	0.115	0.148
74/05/31	16 00								
74/06/30	11 00								
CP(T)-			7.400	2.500	0.400	9.000	9.600	0.171	0.175
74/06/30	16 00								
74/07/31	11 00								
CP(T)-			12.000	1.350	0.230	10.000	10.750	0.148	0.157
74/07/31	16 00								
74/08/31	11 00								
CP(T)-			9.300	4.000	0.070		7.350	0.140	0.124
74/08/31	16 00								
74/09/30	11 00								
CP(T)-			11.600	1.500	1.300		1.850	0.164	0.168
74/09/30	16 00								
74/10/31	11 00								
CP(T)-			16.000	2.500	1.650	0.115	2.900	0.106	0.129
74/10/31	16 00								
74/11/28	11 00								
CP(T)-			18.400	1.900	0.180	9.750	9.750	0.115	0.120
74/11/28	16 00								

STORET RETRIEVAL DATE 75/03/26

5108ZA P05108ZA P006800
38 47 45.0 077 28 20.0
GREATER MANASSAS OLD CENTERVILLE
51 7.5 MANASSAS
T/OCCOQUON RESERVOIR
BULL RUN
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/11/30	00 00								
CP(T)-			14.700	1.900	0.040		1.900	1.280	1.190
73/11/30	24 00								
73/12/28	00 00								
CP(T)-			2.900	2.000	0.050	0.320	0.410	2.520	2.920
73/12/28	24 00								
74/01/28	00 00								
CP(T)-			5.700	1.000K	0.110	0.080	0.240	2.340	2.420
74/01/28	24 00								
74/02/25	00 00								
CP(T)-			10.100	1.900	0.130	0.220	0.410	1.410	1.370
74/02/25	24 00								
74/03/28	00 00								
CP(T)-			11.200	2.325	0.130	0.230	0.420	1.180	1.390
74/03/28	24 00								
74/04/30			7.920	2.500	0.130	0.700	0.990	1.530	1.640
74/05/28	00 00								
CP(T)-			10.800	2.700	0.380	1.400	2.200	1.240	1.570
74/05/28	24 00								
74/06/30	00 00								
CP(T)-			12.600	0.700	0.069	0.770	0.915	1.200	1.730
74/06/30	24 00								
74/07/30	00 00								
CP(T)-			8.300	3.000	0.050	0.720	1.150	1.150	1.220
74/07/30	24 00								
74/08/27			8.900	1.000K	0.078	0.830	1.450	1.450	1.320
74/09/24	00 00								
CP(T)-			10.000	0.975	0.058	0.860	1.000	1.190	1.840
74/09/24	24 00								
74/10/28	00 00								
CP(T)-			11.200	2.600	0.072	0.320	3.600	1.470	1.220
74/10/28	24 00								

K VALUE KNOWN TO BE
LESS THAN INDICATED

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STORET RETRIEVAL DATE 75/03/26

5108ZB P05108ZB P008000
38 47 45.0 077 28 20.0
GREATER MANASSAS LOCH LOMAND
51 7.5 MANASSAS
T/OCCOQUON RESERVOIR
BULL RUN
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/11/28	14 00		1.320	17.300	7.000	6.400	6.600	0.380	0.545
73/12/28	13 30		2.900	8.900	0.230	1.800	1.900	1.900	1.040
74/01/28	10 30		0.560	12.000	1.160	1.760	3.175	1.340	1.200
74/02/25			0.600	15.000	6.300	2.300	4.200	0.720	0.990
74/03/28	09 00								
CP(T)- 74/03/28	15 00		0.520	16.000	5.300	1.950	3.000	0.850	0.880
74/04/30	09 00								
CP(T)- 74/04/3.	15 00		1.000	8.600	0.280	0.850	1.350	0.420	0.860
74/05/28	00 00								
CP(T)- 74/05/28	24 00		0.530	5.500		0.780	1.000	0.890	0.770
74/06/30	09 00								
CP(T)- 74/06/30	15 00		0.810	5.500	0.120	0.920	1.050	1.250	0.970
74/07/30	09 00								
CP(T)- 74/07/30	15 00		2.760	3.000	0.140	0.640	0.860	0.810	0.740
74/08/27	09 00								
CP(T)- 74/08/27	15 00		5.200	3.500	0.120	1.750	1.750	0.600	0.650
74/09/24	09 00								
CP(T)- 74/09/24	15 00		2.300	15.000	0.790	1.700	2.300	0.890	1.060
74/10/28	09 00								
CP(T)- 74/10/28	15 00		4.320	2.700	0.130	1.800	3.400	0.470	0.870

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